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POPULATIONS AND HOST PREFERENCES OF JUNE BEETLES  
IN SOUTHERN WISCONSIN IN 1940By T. R. Chamberlin, Lee Seaton, J. A. Callenbach, and C. L. Fluke<sup>1/</sup>

## Introduction

The cooperative studies herein reported are a continuation of those begun at the University of Wisconsin in 1935. The studies from 1935-1938 inclusive were reported in Supplement to No. 4 of Volume 18 of the Insect Pest Survey Bulletin and in Supplement to No. 3 of Volume 19. No report was submitted for 1939 because the flight of the "Brood B" beetles that year was extremely small. The methods used in 1940 were the same as were used previously and reported on in the papers mentioned.

In 1940 large flights of the "Brood C" beetles in southern Wisconsin were for the most part confined to Lafayette, Iowa, and eastern Grant Counties with some extensions into nearby areas. The observations recorded in this account were made in five groves, one near Dane, in Dane County; one near Poynette, in Columbia County; one near Lamont, in Lafayette County; one near Linden, in Iowa County, Iowa; and one near Gays Mills, in Crawford County, Wis. The approximate location of these groves is shown in Figure 1.

Number of Beetles and Species Collected

Twenty-two collections were made between May 6 and July 6 inclusive, 6 at Lamont, 3 at Linden, 1 at Dane, 1 at Poynette, and 11 at Gays Mills. As shown in tables 1 and 2, a total of 5,068 beetles of 13 species were collected. Of these 1,061 were taken from the grove near Gays Mills and 4,007 from the other groves. The 3 predominant species, viz: Phyllophaga hirticula (Knoch.), P. rugosa (Molsh.), and P. fusca (Froel.), together made up 87.41 percent of the total number of beetles collected. With the exception of the year 1936, when a large flight of P. tristis (F.) occurred in "Brood B" and P. hirticula beetles were very rare, beetles of these 3 species have been most abundant since 1934. In flights of "Brood A", however, P. rugosa has been more abundant than P. hirticula.

<sup>1/</sup> Callenbach made the observations at Gays Mills; Chamberlin, Seaton, and Fluke made the observations in the other localities. This project is part of a cooperative investigation of June beetles and white grubs being conducted by the Bureau of Entomology and Plant Quarantine, of the United States Department of Agriculture and by the University of Wisconsin Agricultural Experiment Station through its department of economic entomology.

In 1940, outside the Gays Mills area and especially at Lamont and Linden where "Brood C" flight was heaviest, P. hirticula was the predominant species and comprised 50.03 percent of the 4,007 beetles collected. P. fusca, which was also abundant, amounted to 31.97 percent, and P. implicita, which ranked third, 5.96 percent.

At Gays Mills Phyllophaga rugosa was the predominant species and comprised 57.59 percent of the 1,061 beetles collected. P. fusca and P. ilicis (Knoch), which ranked second and third, comprised 26.20 and 12.25 percent, respectively, of the total number of beetles.

#### Host Preferences of the Beetles

Because of differences in the relative populations of the various species of beetles and in the host-plant complex, the Gays Mills locality was studied separately from the other areas and is considered separately in this paper.

#### Outside the Gays Mills Area

In Table 1 is a list of all beetles collected from all areas other than Gays Mills and of the host plants from which they were taken. Table 1 is identical in form with those used in the Insect Pest Survey Bulletin Supplements previously referred to. There are three entries in each space, two percentages and a number. The top percentage indicates the proportion of all beetles belonging to the species named at the head of the column, which was taken from the food plant named at the left. The lower percentage gives the proportion of the total number of beetles taken from that host plant made up of the species at the top of the column. The number located between the percentages in each space represents the number of beetles of the species named at the head of the column which were taken from the plant mentioned at the left. Host plants are listed according to the total numbers of beetles of all species collected from them, in descending order, as indicated in the vertical "Total" column. In addition to the plants shown in the tables, grape, sumac, boxelder, and other undetermined plants were examined, but no beetles were found on them.

In these areas Phyllophaga hirticula was taken from 18 kinds of plants. Hazel, bur oak, cultivated plum, and oaks of the red oak group supplied 66.91, 20.82, 2.88, and 2.49 percent, respectively, of the total number of P. hirticula beetles, or 93.11 percent. These hosts have been preferred by P. hirticula during previous years, but in some years shagbark hickory was also fed upon heavily. From observations and from the number of beetles taken by shaking, black walnut is known to be a favored host of P. hirticula but, as walnut was scarce in the areas in which the beetles were hand-picked from hosts, this preference was not shown and consequently is not indicated in the table.

Phyllophaga fusca was taken from 18 food plants also, but there was less concentration of this species on any single host than in the case of P. hirticula. Aspen, bur oak, oaks of the red oak group, and dogwood supplied 34.58, 25.84, 10.38, and 9.68 percent of the collected beetles, respectively, and together 80.48 percent.



Phyllophaga implicita (Horn) was collected from six food plants, of which aspen supplied 93.72 percent of the total.

The favored host plants of the less abundant species are shown in the tables.

#### Guys Mills Area

The host plants observed in the Guys Mills area and the number of beetles taken from them are listed in table 2, which is identical in form with table 1. Phyllophaga rugosa, P. fusca, and P. ilicis, the most abundant species, were each taken from 12 of the 16 listed host plants. Cultivated cherry, butternut, and shagbark hickory together supplied 83.96 percent of the total number of P. rugosa beetles and individually 54.17, 19.97, and 9.82 percent. Butternut and shagbark hickory supplied 66.91 and 16.19 percent of the total number of P. fusca beetles and hazel, shagbark hickory, and butternut 26.91, 25.38, and 12.31 percent of the total number of P. ilicis beetles. Hosts of the less abundant species are given in the table.



# WISCONSIN, 1933

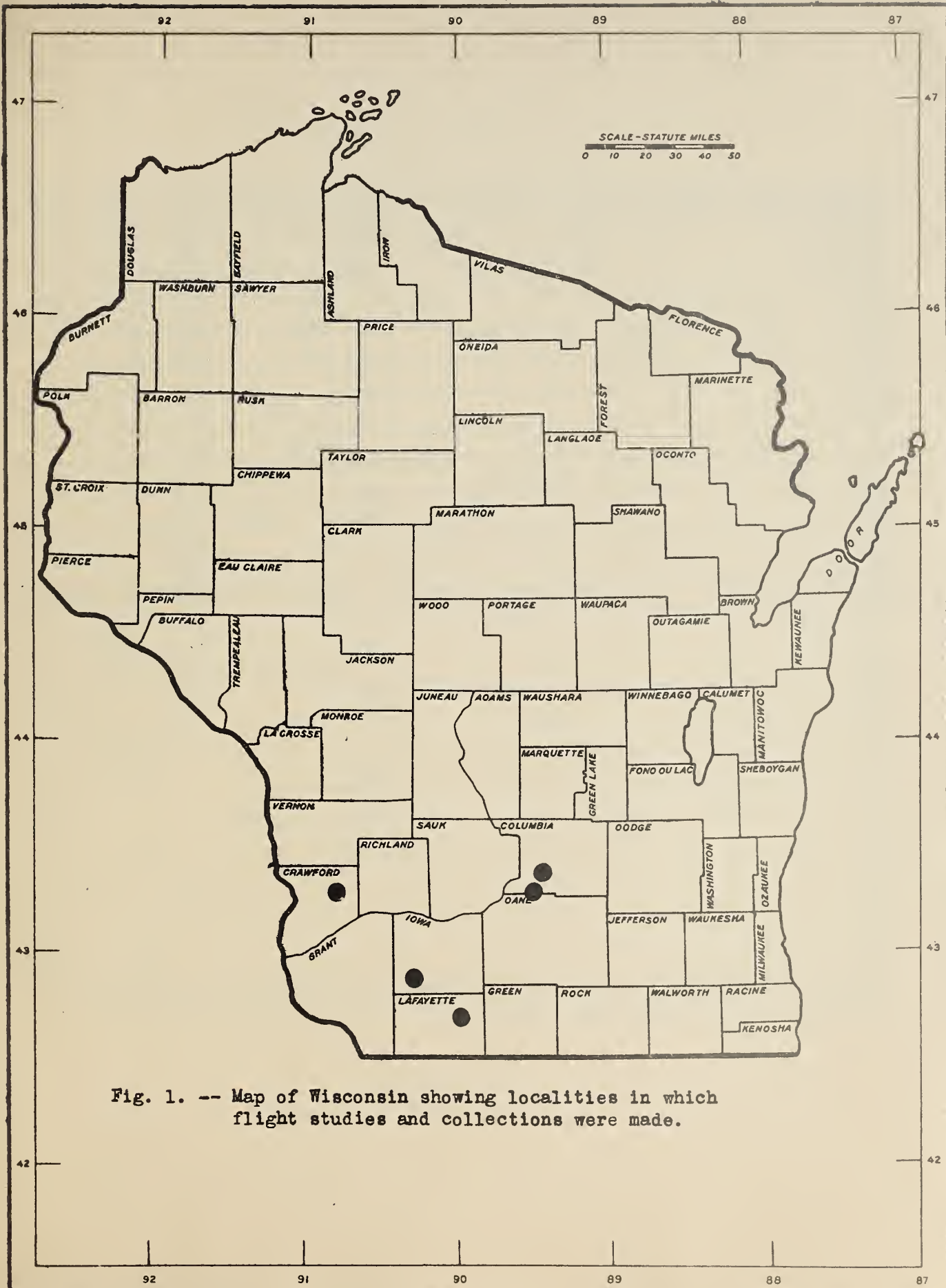
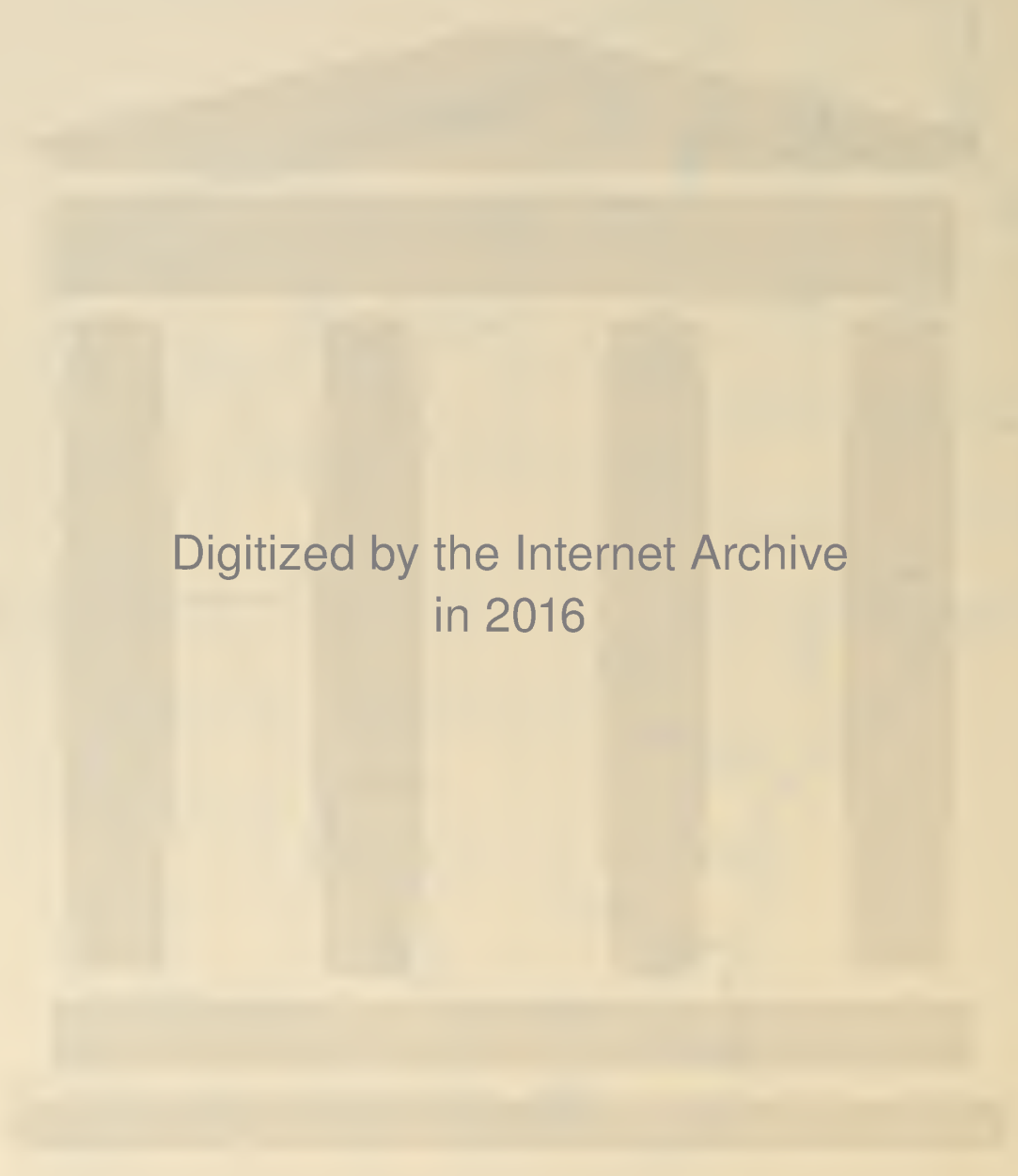


Fig. 1. -- Map of Wisconsin showing localities in which flight studies and collections were made.



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Table 1

Beetles Collected in Southern Wisconsin Outside of Gays Mills Area 1940

Hosts	P.hirticollis	P.fusca	P.implicita	P.rugosa	P.futilis	P.tristis	P.auria	P.drakii	P.licia	P.nitida	P.prunina	P.crenulata	P.bella	Totals
Hazel	88.81% 1395	8.20% 106	2.09% 3	44.44% 72	60.24% 50		19.85% 6	42.11% 8	81.25% 13	80.00% 9	28.57% 2	50.00% 3	40.00% 2	41.89% 1970
Bur Oak	95.53% 434	6.29% 351	.30% 1	4.51% 1	2.99% 2	50.79% 32	.36% 1	.49% 1	.78% 1	.34% 1	.12% 1		.12% 1	100.00% 902
Aspen	20.82% 1	25.84% 1		.62% 1	2.41% 2	3.99% 2							20.00% 1	20.01% 99.98%
Aspen	54.11% 1	41.27% 1	93.72% 224	.62% 1	2.41% 2		32.28% 10	47.87% 9	12.50% 2				20.00% 1	17.34% 719
Red Oak (group)	3.78% 62	91.91% 133	31.15% 1	.14% 1	.28% 1		1.89% 25	1.25% 1	.28% 1				.14% 1	100.00% 286
Dogwood	2.49% 1	10.35% 124		43.21% 70		39.85% 2					71.43% 3	16.87% 1		7.14% 138
Dogwood	18.19% 1	49.50% 99.99%		24.48% 1	4.82% 4	8.74% 4	12.90% 4	5.28% 1		100.00% 1	1.73% 1	16.67% 1		3.44% 138
Plum (cult.)	.05% 1	9.88% 124		1.23% 2	4.82% 4		2.80% 4	.72% 1		.72% 1		.72% 1		99.99% 1.80%
Crataegus	2.88% 60	.55% 7	.42% 7		4.82% 4									72
Crataegus	83.33% 22	9.72% 22	1.39% 1		6.39% 3									100.00% 1.27%
White Oak	1.08% 43	1.72% 22	.42% 1	3.09% 1	1.20% 1									61
White Oak	43.14% 21	43.14% 9	1.98% 1	9.80% 10	1.98% 1		3.17% 2					16.67% 1		1.07% 43
Rose	1.01% 21	.70% 9		8.17% 10			4.65% 2					2.33% 1		100.01% 100.01%
Elm	49.84% 1	20.93% 1		23.28% 1										.95% 39
Elm	1.34% 29	.47% 6			3.61% 3			5.28% 1						99.99% 38
Hickory (shag bark)	73.88% 4	15.79% 9	2.93% 7		7.99% 7		35.48% 11	2.63% 1						.95% 38
Butternut	.20% 10	.70% 9	2.93% 7		8.43% 7		28.95% 11							100.00% 100.00%
Blackberry	10.53% 29	23.98% 100.00%	19.42% 100.00%		19.42% 100.00%									.75% 29
Gooseberry	.34% 7	1.01% 13		.62% 1										.62% 21
Walnut	53.33% 11	91.90% 4		4.78% 1										99.99% 19
Walnut	.53% 11	.31% 4			3.61% 3								20.00% 1	.47% 19
Plum (wild)	67.99% 11	21.05% 9			13.79% 1								3.28% 1	99.99% 17
Raspberry	.53% 11	.47% 9												.42% 100.00%
Strawberry	94.71% 1	33.29% 10			1.20% 1									.27% 11
Apple (crab)	.78% 8	90.91% 23			9.09% 3									100.00% 11
Apple	.38% 72	.23% 72.73%												.27% 100.00%
Apple	.05% 1	.05% 1			4.82% 4									.12% 5
Apple	20.00% 1				90.00% 4									100.00% 100.00%
Milkweed			.42% 1		1.20% 1									.05% 2
Milkweed			50.00% 1		50.00% 1									100.00% 100.00%
Bittersweet					1.20% 1									.02% 1
Bittersweet	.05% 1				100.00% 1									100.00% 100.00%
Cherry (wild)	100.00% 1	.08% 1												.02% 1
Mint like plant		100.00% 1												100.00% 100.00%
TOTALS	100.08% 2085	99.99% 1281	100.00% 289	100.00% 162	99.97% 88	99.99% 63	99.99% 81	100.00% 19	100.00% 16	100.00% 10	100.00% 7	100.01% 6	100.00% 5	99.94% 4007
	52.03%	31.97%	5.98%	4.04%	2.07%	1.57%	.77%	.47%	.40%	.25%	.17%	.15%	.12%	99.97%



Table 2

Beetles Collected in Gays Mills Area 1940

	<i>P. rugosa</i>	<i>P. fusca</i>	<i>P. illotis</i>	<i>P. implioita</i>	<i>P. hirticula</i>	<i>P. tristis</i>	<i>P. nitida</i>	<i>P. bella</i>	Totals
<b>Host</b>									
Cherry (cult.)	54.17% 331	3.24% 9		22.22% 4	7.69% 1	40.00% 2	33.33% 1		348
Butternut	95.11% 19.97% 122	2.59% 66.91% 186	12.51% 16	1.16% 33.33% 6	.29% 38.46% 5	.67% 20.00% 1	.29% 33.33% 1		318
Hickory (shag bark)	36.09% 9.82% 60	56.03% 16.19% 45	4.79% 25.35% 33	1.78% 25.35% 33	1.46% 30.77% 4	.29% 2.76% 2	.29% 33.33% 1		358
Hazel	41.67% 4.58% 28	51.25% 5.40% 15	22.92% 26.92% 35		2.76% 16.38% 2	20.00% 1.22% 1	33.33% 1.22% 1		82
Elm	34.15% 4.09% 25	18.29% 1.44% 4	42.65% 3.08% 4	22.22% 4	2.44% 2	1.22% 1	1.22% 1		37
Ironwood	67.57% 2.62% 16	10.81% 1.44% 4	10.81% 8.46% 11	10.81% 4					31
White Oak	51.61% 1.96% 12	12.90% .36% 1	35.46% 3.08% 4		20.00% 1				18
Red Oak (group)	66.67% 12	5.55% 1	22.22% 4	12.31% 16		5.55% 1			16
Cataegus	.98% 6	.72% 2	100.00% 1	1.54% 2	7.69% 1				11
Basswood	54.55% .49% 3	18.18% 2.16% 6	18.18% .77% 1	5.56% 1	9.09% 1				11
Aspen	27.27% .98% 6	54.55% 9.09% 3	9.09% 16.67% 5	33.33% 33.33% 3					9
Dogwood	66.67% 4	1.44% 5	3.85% 5						9
Flgnt Hickory		44.44% .36% 1	55.56% 1.54% 2						3
Lah		33.33% .36% 1	66.67% .77% 1						2
Apple	.16% 1	50.00% 1	50.00% 1						1
Undetermined	100.00% .16% 1								1
Totals	39.96% 611	100.02% 278	100.01% 180	100.00% 18	99.99% 13	100.00% 5	99.99% 3	100.00% 3	1061
	57.59%	26.20%	12.25%	1.70%	1.23%	.47%	.26%	.28%	100.00%

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